

Title (en)  
ANTENNA DEVICE

Title (de)  
ANTENNENVORRICHTUNG

Title (fr)  
DISPOSITIF D'ANTENNE

Publication  
**EP 3641060 A4 20200624 (EN)**

Application  
**EP 18817484 A 20180215**

Priority  
• JP 2017116760 A 20170614  
• JP 2018005297 W 20180215

Abstract (en)  
[origin: EP3641060A1] To obtain a more favorable radiation pattern even in a case of arraying a plurality of antenna elements. An antenna device includes a dielectric substrate, a plurality of antenna elements that disposed along a first direction and respectively transmits or receives a first wireless signal and a second wireless signal having different polarization directions from one another, and a ground plate provided with a long slot to extend in a second direction in a region corresponding to a region between first and second antenna elements next to each other, and a length L in the second direction of the slot satisfies a conditional expression below where a wavelength of the wireless signal is  $\lambda_{\text{sub}0}$ , a relative dielectric constant of the dielectric substrate is  $\epsilon_{\text{sub}1}$ , and a relative dielectric constant of a dielectric located on an opposite side of the dielectric substrate with respect to the ground plate is  $\epsilon_{\text{sub}2}$ .  $L > \lambda_{g2}, \lambda_{g2} = \lambda_{0\epsilon r1 + \epsilon r2/2}$

IPC 8 full level  
**H01Q 1/52** (2006.01); **H01Q 1/24** (2006.01); **H01Q 9/04** (2006.01); **H01Q 21/08** (2006.01); **H01Q 21/28** (2006.01)

CPC (source: EP US)  
**H01Q 1/243** (2013.01 - EP); **H01Q 1/48** (2013.01 - US); **H01Q 1/523** (2013.01 - EP); **H01Q 9/0435** (2013.01 - EP); **H01Q 13/10** (2013.01 - US); **H01Q 21/064** (2013.01 - US); **H01Q 21/08** (2013.01 - EP); **H01Q 21/24** (2013.01 - US); **H01Q 21/28** (2013.01 - EP)

Citation (search report)  
• [I] CN 101316008 B 20120627 - HARBIN INST OF TECHNOLOGY  
• [A] US 2012235881 A1 20120920 - PAN HELEN K [US], et al  
• [I] OUYANG J ET AL: "Reducing Mutual Coupling of Closely Spaced Microstrip MIMO Antennas for WLAN Application", IEEE ANTENNAS AND WIRELESS PROPAGATION LETTERS, IEEE, PISCATAWAY, NJ, US, vol. 10, 1 January 2011 (2011-01-01), pages 310 - 313, XP011480385, ISSN: 1536-1225, DOI: 10.1109/LAWP.2011.2140310  
• [T] WANG CHIEN-JEN ET AL: "Modeling of Stepped-Impedance Slot Antenna", IEEE TRANSACTIONS ON ANTENNAS AND PROPAGATION, IEEE SERVICE CENTER, PISCATAWAY, NJ, US, vol. 62, no. 2, 1 February 2014 (2014-02-01), pages 955 - 959, XP011538743, ISSN: 0018-926X, [retrieved on 20140130], DOI: 10.1109/TAP.2013.2291906  
• [A] ASIEH HABASHI ET AL: "A rectangular defected ground structure (DGS) for reduction of mutual coupling between closely-spaced microstrip antennas", ELECTRICAL ENGINEERING (ICEE), 2012 20TH IRANIAN CONFERENCE ON, IEEE, 15 May 2012 (2012-05-15), pages 1347 - 1350, XP032231868, ISBN: 978-1-4673-1149-6, DOI: 10.1109/IRANIANCEE.2012.6292566  
• [A] MOHSEN SALEHI ET AL: "Elimination of scan blindness in microstrip scanning array antennas using defected ground structure", MICROWAVE CONFERENCE, 2007. EUROPEAN, IEEE, PI, 1 October 2007 (2007-10-01), pages 482 - 484, XP031191840, ISBN: 978-2-87487-001-9, DOI: 10.1109/EUMC.2007.4405232  
• See references of WO 2018230039A1

Cited by  
US11901637B2; EP3683891A4; US11239571B2

Designated contracting state (EPC)  
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

Designated extension state (EPC)  
BA ME

DOCDB simple family (publication)  
**EP 3641060 A1 20200422**; **EP 3641060 A4 20200624**; **EP 3641060 B1 20211124**; CN 110870138 A 20200306; CN 110870138 B 20210817; JP 6850993 B2 20210331; JP WO2018230039 A1 20200402; US 11075462 B2 20210727; US 2020144729 A1 20200507; WO 2018230039 A1 20181220

DOCDB simple family (application)  
**EP 18817484 A 20180215**; CN 201880046521 A 20180215; JP 2018005297 W 20180215; JP 2019525071 A 20180215; US 201816619968 A 20180215